

CUSTOMIZABLE HAND-HELD COMPUTER**RELATED APPLICATION**

This application claims priority under 35 U.S.C. § 119(e) based on U.S. provisional application Ser. No. 60/031,853 (Attorney Docket No. 38297P1), filed Dec. 5, 1996.

TECHNICAL FIELD

This invention pertains to a system and method for the manufacture or configuration of customizable hand-held computers, and more particularly, to a system and method for the manufacture or configuration of hand-held computers whereby a variety of interchangeable parts are employed to produce a variety of custom configurations.

BACKGROUND OF THE INVENTION

Portable computers, such as hand-held data entry terminals, personal digital assistants, and the like are commonly used in a variety of applications. For example, such computers are commonly used by individuals for personal computing purposes, by sales persons, distributors, delivery persons, auditors, and the like, where it is advantageous to employ a portable computer terminal in a route or otherwise mobile setting. Such applications include sales, distribution, control and inventory of products delivered, and delivery or tracking of products, packages, etc. Portable or hand-held data terminals have proven useful in increasing the efficiency of such applications by automating the entry and electronic storage of order, sales, delivery, receipt, pricing, inventory control, and other accounting functions.

Users of hand-held computer systems have a variety of needs and budgets, ranging from simple data collection and storage units to advanced systems for sales or distribution automation allowing real time communication with a wireless network.

To accommodate a variety of needs and budgets, it is known to provide a basic data collection and storage terminal whereby additional peripheral devices can be added, depending on a user's needs. Examples of such peripheral devices include bar code scanners or other optical scanning devices, additional RAM, hard drives or other mass storage device such as devices for storage on removable magnetic media, optical media, magneto-optical media, removable hard drive media, and the like, CD ROM, recordable (read/write) CD, or DVD drives, magnetic stripe readers, wired or wireless LAN links, WAN links, CDPD links, microlink, optical links, ultrasound links, extra battery packs, etc.

A data terminal may be designed with basic data collection and storage features and a means for attaching additional units as desired. Such additional units can be attached to the end of the data terminal, for example. While such a system provides expandability, there are disadvantages. For example, computers designed for mobile use are often ruggedly constructed to meet certain criteria, e.g., repeated drops or a minimum number of drops from a given height on concrete, etc. However, the same terminal designed with a certain degree of ruggedness may lose its survivability with a module such as a scanner or an RF transceiver, etc., attached as an end unit. Alternatively, the attached module may not possess the same survival characteristics as the terminal to which it is attached.

Another disadvantage of employing end unit modules is that the mass distribution and balance are altered and the same unit with an end cap module may not be as ergonomically favorable to use.

Yet another disadvantage of end cap module systems is moisture problems. Hand-held units which can withstand use in inclement weather may lose this ability when an end cap module with an inferior seal is employed.

Finally, when a peripheral device is connected externally, it may be difficult to provide adequate shielding, causing problems with electromagnetic interference, problems with dissipation of a discharge of accumulated static electricity by a user, etc.

Some of the aforementioned problems, such as balance, shielding, weather resistance may be alleviated in systems which employ expandable modules or pods, e.g., scanners, RF transceivers, memory, modems, etc., which are designed to fit on a surface such as the undersurface of a hand-held terminal which contains a removable plate, rather than the end of the data terminal. The housing of such pods can sealingly engage with the housing of the data terminal, and the housing can contoured for a user's hand.

Thus, it is desirable to provide a data terminal system of components and method of manufacture that provides a range of configurations from simple data collection capabilities for later batch transfer of data to the most advanced and demanding applications, and that can be manufactured and upgraded employing interchangeable and exchangeable components without relying on custom designed upgrade modules. In addition to the problems with ruggedness, ergonomics, moisture, and shielding, a problem with data terminal design based on the use of attachable expansion modules is design costs required to meet a variety of needs since each terminal type often requires a specially designed upgrade component. For example, the peripheral end cap units or pods are often designed for use with a particular unit or several related units since such an externally mounted unit is dependent on the shape and configuration of the hand-held terminal it is designed for. Also, typically, only one end cap module could be used at a time, thus limiting expandability. Thus, as an example, whether a user with a basic data collection terminal which employs an end cap or pod module upgrades can upgrade to both scanning capability and wireless RF link simultaneously depends on whether an integrated scanner/radio module exists for the particular terminal. As a result, multiple and often incompatible designs providing different levels of mobile computing features have proliferated, and a user desiring to upgrade a mobile computing system's capabilities may be required to choose between losing its initial investment in terminals, terminal docks, peripherals, custom software, etc., by switching to a more advanced system or doing without additional features.

SUMMARY OF THE INVENTION

It is, therefore, and object of the present invention to provide a hand-held data terminal system which can easily be configured to a wide variety of capabilities, both during the manufacturing or configuring process and as a later upgrade, and which employs standardized and interchangeable parts, thus resulting in decreased design parts.

This and other objects of the present invention are provided by the data terminal system, and process for the manufacture thereof, having a housing which comprises an upper shell and a base shell, and wherein standardized and/or interchangeable hardware components are employed and wherein any number or combination of additional or peripheral components may be added by employing a base shell of the appropriate size and mounting configuration (or, in the case of upgrades, replacing the existing base shell with one designed to accommodate the additional components).